have induced the Council to recommend that the next autumn meeting should be held in Paris. A sum of 2,318*l.* has been raised by the Institute for the widow and family of Mr. Jones, the late general secretary.

The President stated that the Bessemer medal had been awarded to Prof. Tunner, of Leoben, Austria, in consequence of the great distinction that gentleman had earned for himself in his researches in that branch of science which the Institute so specially represented.

One of the most important papers read was by Mr. I. Lowthian Bell, M.P., F.R.S., on the separation of phosphorus from pig iron. In this paper Mr. Bell detailed his further experiences in his endeavours to eliminate the phosphorus from the iron, its presence having a weakening effect on the metal. Fully five-sixths of the pig iron manufactured in Great Britain is made from ores which, when smelted, give a product containing from three-tenths of a unit to nearly 2 per cent. of phosphorus. When, however, this element exists in pig iron to the extent of much more than one-tenth of a unit per cent. it is unfit for the Bessemer converter—at all events when ordinary spiegel iron, containing 10 or 12 per cent. of manganese, is used for its final purification. Bessemer steel rail-makers are, therefore, obliged to reject iron which formerly sufficed for the manufacture of iron rails, an iron comparatively free from phosphorus being necessary. That, therefore, affected the prosperity of the mines which formerly supplied the rail makers with ore, as well as the blast furnaces which produced the pig iron from that ore. Mr. Bell explained that at the high temperature of the Bessemer converter, while the carbon was removed by the air during its passage through the metal, the phosphorus was not affected. This he stated was also the case to a certain extent in the ordinary refinery furnaces; with a more moderate temperature, however, the conditions which bound carbon and phosphorus with iron were materially changed. The iron was more or less oxidised, and the oxide of iron so formed acted on the carbon and phosphorus. When the phosphorus is removed its loss is accompanied by a separation of the carbon contained in the pig iron. Loss of carbon, however, deprives the metal of its susceptibility of fusion at the temperatures at which the operation of refining and puddling are carried on, and when once the metal is solid the further elimination of phosphorus is very difficult, if not impossible. Mr. Bell expressed the opinion that a lower temperature probably weakened the affinity of phosphorus for iron, as they existed in the crude metal, or strengthened the affinity between oxide of iron and phosphoric acid. A third condition involved in the mere condition of heat might be a diminution of the power possessed by oxide of iron in attacking the carbon, that element which enabled the crude metal to maintain fluidity when moderately heated. The author said that whichever one or more than one of the three conditions was required, the fact remained that melted crude iron might be maintained in contact with melted oxide of iron, and still retain carbon enough to prevent it solidifying, while the phosphorus rapidly disappeared. Instances were given of 95 per cent. of phosphorus being removed, while only 10 per cent of the carbon had been dissipated. The process consists in the more rapid agitation of the two substances while in a liquid condition. The iron so heated may be puddled for the production of malleable iron, or used for the manufacture of steel. Specimens of steel of the highest quality which had been so produced at the Royal Arsenal, Woolwich, were exhibited.

Dr. Percy, F.R.S., gave some particulars as to the manufacture of Japanese copper. Bars of this metal present a beautiful rose-coloured tint on their surface, which is due to an extremely thin and pertinaciously adherent film of red oxide of copper or cuprous oxide. This tint is not in the least degree affected by free exposure to the atmosphere. Dr. Percy placed before the meeting bars which he had possessed for thirty years, and which had undergone no change, although freely exposed to the atmosphere. The secret of this result lies in casting the copper under water, the metal being very highly heated and the water being also made hot. Dr. Percy stated that he had succeeded in casting copper in this way, and had produced similar results to those shown in the Japanese metal.

Other papers read were:—"On some Recent Improvements in the Manufacture of Iron Sponge by the Blair Process," by Mr. J. Ireland; "Statistics on the Production and Depreciation of Rails," by Mr. Charles Wood; "On Steel-casting Apparatus," by Mr. Michael Scott; "On Railway Joints," by Mr. C. H. Halcomb; and "On the Manufacture of Bessemer Steel and Steel Rails," by Mr. C. B. Holland.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Council of the Senate recommend that the application of Prof. C. C. Babington for skilled assistance at the Botanical Museum be granted, and that an assistant curator of the Herbarium be appointed at a salary of 100*l.* per annum, the appointment to be made by the Professor with the consent of the Vice-Chancellor, and to be for a period of four years. It is in contemplation to appoint a non-collegiate student.

BALTIMORE.—The Anniversary of the Johns Hopkins University was celebrated on February 22, when addresses were given by some of the professors and others. So far the progress of the University has been thoroughly satisfactory. One of its principal aims is to encourage original research, both among professors and students, and fellowships are granted to those who show aptitude for such work. Prof. Remsen, in his address, showed that a lofty idea of what original research really is, is entertained at the University; it is not merely the establishing of an isolated fact, the devising of a new piece of apparatus, the simple analysis of a new mineral, the discovery of an extra tooth in some abnormal animal; it is, rather, a systematic attempt to solve a definite problem, involving the use of a variety of methods peculiar to the special branch in which the attempt is made. In the three laboratories, biological, physical, and chemical, a variety of important work is being carried on, and altogether, both in the kind and amount of work which is being done under the auspices of the university, the trustees and professors show that they have a thorough appreciation of the spirit of the founder's legacy.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, March 14.—Lord Rayleigh, F.R.S., president, in the chair.—Mr. Artemas Martin, Erie, Pa., was proposed for election.—The Secretary communicated a paper by Prof. J. Clerk Maxwell, on the electrical capacity of a long narrow cylinder and of a disc of sensible thickness. Prof. Cayley, Mr. J. W. L. Glaisher, Mr. Roberts, and the President made short communications.

Royal Astronomical Society, March 8.—Lord Lindsay, president, in the chair.—Mr. Neison read a paper on Hansen's terms of long period in the lunar theory. Mr. Proctor drew some diagrams referring to the position of the axis of Mars, and spoke upon Mr. Stone's paper of last January. Mr. Neison made some illustrative remarks thereon.—A paper by Mr. Plummer was read on the supposed influence of a mass of brickwork upon the errors of a transit instrument in its neighbourhood. Several Fellows commented upon this paper and described the lively behaviour of their transit-piers; Mr. Dunkin said there was nothing new about it.—A paper by Mr. Stone was read on telescopic observations of the Transit of Venus. Mr. Gill spoke on the difficulties concerning contacts, and some discussion followed.—A paper was announced by Prof. Sedley Taylor on Galileo's trial before the Inquisition in the light of recent researches; likewise an atlas of the ecliptic, by Heiss, of stars down to the fifth magnitude on Mercator's projection, made in order to get people to lay down the zodiacal light.—There were several other papers.

Entomological Society, March 6.—H. W. Bates, F.L.S., F.Z.S., president, in the chair.—Mr. John Woodgate was elected a Member of the Society.—Mr. F. Moore, at the request of Sir W. H. Gregory, late governor of Ceylon, exhibited a large series of drawings, executed by native artists, of the transformations of the lepidoptera of the island. These drawings were made under the direction of Dr. Thwaites, and represented, for the first time, the life-history of many species.—Mr. McLachlan exhibited some entomological parts of the great Russian work "Fedtschenkos' Travels in Turkestan."—Mr. H. Goss exhibited a small collection of fossil insects obtained by Mr. Gardner from the Bournemouth leaf beds (middle eocene). The collection comprised numerous elytra of coleoptera, and wings of neuroptera, &c.—Mr. J. Mansel Weale read some notes on South African insects. These referred to variation in *Pieris severina* and *Pieris mesentina*; to the secretion of formic acid in *Termes triniverius*, and the probable localisation of the same in a cephalic process, and also to the larvæ of some Hesperidæ in relation to the subject of protective resemblance.—Mr. Ed. Saunders read a paper entitled "Remarks on the Hairs of some of our British Hymen-

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optera." From a microscopical examination the author found that the presence of branched or plumose hairs is characteristic of the Anthophila, whilst the hairs of the Fossores, of Heterogyna, and of the Diploptera, are all simple, or in some cases twisted.—Mr. A. G. Butler communicated a paper on the natural affinities of the lepidopterous family Ægeriidæ. From an examination of structural characters, Mr. Butler considered that these insects presented no resemblance to the Sphingidæ, with which they had hitherto been allied, but were more related to the Pyrales and the Gelechiidæ. The president, in favour of this view, remarked that the whole of the Ægeriidæ had been made to depart from their congeners in appearance, through the action of mimicry.—The Secretary read a paper, by Mr. A. H. Swinton, on the biology of insecta, as determined by the emotions. The paper dealt chiefly with cases of simple muscular contractions and secretions.—Mr. Peter Cameron communicated a paper on some new genera and species of Tenthredinidæ.

Zoological Society, March 5.—Prof. Newton, F.R.S., vice-president, in the chair.—Mr. Sclater exhibited and made remarks on a second collection of birds from Duke of York Island, New Britain and New Ireland, which he had received from the Rev. George Brown, C.M.Z.S.—Mr. Sclater exhibited and made remarks upon a specimen of *Athene variegatæ*, and upon the type-specimen of *Fulica gallinuloides* of King, belonging to the Museum of Science and Art, Edinburgh.—Prof. Newton, F.R.S., drew attention to the statement of Legaut that every Solitaire (*Pezophaps solitaria*) carried a stone in its gizzard, and exhibited one of three stones found by Mr. Caldwell, C.M.Z.S., associated with the remains of as many birds of that species in the caves of Rodriguez.—Mr. T. J. Parker described the stridulating apparatus of *Palinurus vulgaris*, which consisted in a peculiar modification of the second joint of the antennæ working against the lateral surface of the antennulary sternum.—A communication was read from Mr. C. Spence Bate, C.M.Z.S., containing an account of the crustaceans of the Coast of Coromandel, collected by Sir Walter Elliot, K.C.S.I.—Mr. A. Boucard, C.M.Z.S., read notes on some coleoptera of the genus *Plusiotis*, and gave descriptions of three new species from Mexico and Central America.—A communication was read from Mr. Arthur G. Butler, F.Z.S., containing an account of a small collection of lepidoptera, obtained by the Rev. J. S. Whitmee, at the Ellice Islands.—A communication was read from Mr. Edward J. Miers, F.Z.S., on the *Penæidæ* in the collection of the British Museum.—Mr. George French Angas read the description of a new genus of land shells belonging to the family *Cyclophoridæ*, for which he proposed the name of *Mascaria*.—Mr. Angas also read descriptions of nine new species of land and marine shells from various localities, amongst which was a new *Rostellaria*, proposed to be named *R. luteostoma*, and a new *Bulimus* from Madagascar, proposed to be called *B. watersi*.—A communication was read from Dr. G. E. Dobson, C.M.Z.S., containing additional notes on the chiroptera of Duke of York Island and the adjacent parts of New Ireland and New Britain.—A communication was read from Mr. Robert Collett, C.M.Z.S., containing an account of *Latrunculus* and *Crystallogobius*, two remarkable forms of gobioid fishes found in Scandinavia.

Institution of Civil Engineers, March 26.—Mr. Bateman, president, in the chair.—The paper read was on direct acting or non-rotative pumping engines and pumps, by Mr. Henry Davey, Assoc. Inst. C.E.

Paris

Academy of Sciences, March 25.—M. Fizeau in the chair.—The following papers were read:—Experiments designed to imitate various forms of foldings, distortions, and ruptures presented by stratified rocks, by M. Daubrée. He used an apparatus in which vertical and horizontal pressure could be produced, with screws, on sheets of metal of various thickness (especially lead), also sheets of wax mixed with plaster, resin, turpentine, &c. Various effects of a geological character were obtained.—Craniology: the Tasmanian race, by MM. de Quatrefages and Hamy. This relates to the sixth volume of the author's "Crania Ethnica." The Tasmanians formed a race by themselves, and remarkably homogeneous. Their cranial capacity is considerably over that of the Nubian negroes, yet the latter are socially much above the former. On the whole, the Tasmanian cranium does not present marked signs of inferiority. M. Hamy's measurements were made on at least fifty-four osseous heads and six skeletons.—On the treatment of wounds by occlusion, by M. Ravaisson-Mollien. In the winter of 1869, suffering greatly from chapped hands, he filled the wounds with filaments of wadding and then covered them with collodion. This gave relief and speedy cure. He communicated the fact to M. Nelaton, who, with M. Guerin, was then studying the treatment of wounds with occlusion of air.—Observations on the nature of the plants united in the group of *Nœgerrathia*; generalities and type of *Nœgerrathia foliosa*, Sternb., by M. De Saporta.—On the origin of the Phylloxera discovered at Bades (Eastern Pyrenees), by M. Planchon. This outbreak is shown to be due to introduction of some 500 vine-stocks from Gard, in France, five years ago. It is a mistake to regard the American vines as alone pestiferous. M. Duval Jouve was elected correspondent for the Section of Botany, in room of the late M. Hofmeister.—On a map of the erratic blocks of the valley of the Arboust, ancient glacier of Oo (environs of Lachon, Haute Garonne), by MM. Trutat and Gourdon.—M. Dumas presented fascicle A of Measurements of the photographic negatives of the Transit of Venus.—M. Lecoq de Boisbaudran stated that he had prepared several anhydrous chlorides, bromides, and iodides of gallium. The atomic weight of gallium (according to two experiments) was 69·9.—Results of observations in 1877 on the sun's limb on the lines *b* and 1474 *k*, by M. Tacchini. The mean number of positions daily of these lines shows a minimum in agreement with that of the sun-spots. From maximum to minimum the diminution of visibility of *b* is greater than for 1474 *k*. Iron has an enormous preponderance at the base of the chromosphere; magnesium comes next. The other substances are of comparatively slight frequency, and they nearly disappear at the minimum of spots.—New considerations on the observation and reduction of lunar distances at sea, by MM. Beuf and Perrin.—On the effects of the rheostatic machine, by M. Planté. *Inter alia*, the difference in character of the electricity from the positive pole and that from the negative is more marked than with the electric machine or induction coil. (The forms of the sparks are described.)—On a *camera lucida*, by M. Pellerin. This describes an arrangement (copying M. Cornu's polariser) which gives two images of the same intensity visible at the same time by the whole pupil.—On a hydrate of ether, by M. Tanret. In filtering an etherised solution in free air, a crystallisation occurs at the upper part of the filter. This, got otherwise in larger quantity, was what the author examined, and found a true combination of ether and water of the nature of cryo-hydrates.—On the constitution of wool and some similar products, by M. Schutzenberger. Wool gives a fixed residue presenting the same elementary and immediate composition as that of albumen; the proportions of ammonia, carbonic acid, and oxalic acid are considerably higher than with albumen; acetic acid and pyrrol are in similar proportions.—On the formation of partitions in the stylospores of Hendersonias and Pestalozzias, by M. Crié.—On some new facts of perlitism of rocks, and on the artificial reproduction of perlitic fissures, by MM. Fouqué and Lévy. This reproduction is by treating hydrofluosilicic acid with excess of carbonate of lime, filtering the mixture (slightly diluted with water), receiving a drop of the liquid which passes on a piece of glass covered with Canada balsam, and letting dry.—On the period of rotation of solar spots, by Mr. Brown.—M. Gaiffe presented an apparatus which enables one to determine immediately, by a simple reading, the electromotive force of any electric generator.

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